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# Economic and Social-Class Voting in a Model of Redistribution with Social Concerns\*

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## Abstract

We investigate how social status concerns may affect voters' preferences for redistribution. Social status is given by a voter's relative standing in two dimensions: consumption and social class. By affecting the distribution of consumption levels, redistribution modifies the weights attached to the two dimensions. Thus, redistribution not only transfers resources from the rich to the poor, but it also amplifies or reduces the importance of social class differences. Social status concerns can simultaneously lead some members of the working class to oppose redistribution and some members of the socio-economic elites to favor it. They also give rise to interclass coalitions of voters that, despite having different monetary interests, support the same tax rate. We characterize these coalitions and discuss the resulting political equilibrium.

*JEL Classification:* D10, D63, H23.

*Keywords:* redistribution, economic voting, social status, status-seeking.

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# 1. Introduction

Redistributive policies are among the most salient political issues in virtually all electoral campaigns and scholars in economics and political science have long investigated voters' attitudes toward this key policy dimension.<sup>1</sup>

Standard models of political economy indicate income as the main determinant of these attitudes. This is “economic voting” (Romer, 1975; Roberts, 1977; Meltzer and Richard, 1981): low-income voters should favor greater redistribution (hence, tax rates), while high-income voters should oppose it. However, from an empirical point of view, this negative correlation between income and support for redistribution is far from perfect.<sup>2</sup> On the one hand, a sizable fraction of working-class individuals are less in favor of redistribution than what their material interest would suggest. On the other hand, segments of the socioeconomic elites support high levels of redistribution, even though this hurts them from a monetary point of view. These patterns are relevant from an empirical point of view (Gilens, 1999; Fong, 2001) and populate political chronicles with reports of blue-collar workers voting against taxation and expressions such as “champagne socialists” or “radical chic”.

Although the deviations from economic voting highlighted above seem the two sides of the same coin, the literature has mostly studied each of them in isolation. Papers that implicitly or explicitly rely on some notion of reciprocity or solidarity (Corneo and Grüner, 2000, Fong, 2001, Luttmer, 2001, Alesina and Glazer, 2004, Giuliano and Spilimbergo, 2014) can explain

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<sup>1</sup>According to Pew Research Center, in 2016 US Presidential Election, 67% of registered voters deemed social security as a very important topic for their voting decision. The percentages for other redistributive policies such as health care and education were 74% and 66%, respectively. Similar numbers hold true for recent elections in European countries.

<sup>2</sup>See Alesina and Giuliano (2011) and Costa-Font and Cowell (2015) for recent surveys. More in details, attitudes toward redistribution have been explained through individual histories (Giuliano and Spilimbergo, 2014, Fisman et al., 2015), culture and race (Alesina and Glazer, 2004, Luttmer and Singhal, 2011), beliefs concerning the returns to effort (Bénabou and Tirole, 2006a), subjective assessments of the fairness of market outcomes (Fong, 2001, Alesina and Angeletos, 2005), social mobility (Piketty, 1995, Bénabou and Ok, 2001, Alesina and La Ferrara, 2005, Acharya, 2014, Alesina et al., 2018), issues of group loyalty and social identity (Corneo and Grüner, 2000, Luttmer, 2001, Corneo and Grüner, 2002, Shayo, 2009, Cervellati et al., 2010), or the structure of inequality (Lupu and Pontusson, 2011).

why the elites support high levels of redistribution.<sup>3</sup> However, they cannot easily rationalize why non-negligible fractions of the less well-off dislike high taxes, unless they assume that these individuals have wrong perceptions about relative standings in society. Papers that highlight the role of social identity or the relative position of the middle class in the income distribution (Shayo, 2009, Lupu and Pontusson, 2001) can instead easily rationalize the first discrepancy (low-income citizens voting against high taxes) but have harder times in explaining the second deviation (members of the elite favoring high taxes). Finally, papers that focus on agents' expectations about future prospects (Piketty, 1995; Bénabou and Ok, 2001; Bénabou and Tirole, 2006a) can potentially generate both behaviors, but this would require prospects of opposite sign to be simultaneously and somehow counterintuitively at play within the same society: members of the working class voting against high taxes because they expect that they will soon climb the social ladder and members of the elite favoring high taxes as they fear downward mobility.<sup>4</sup>

In this paper, we introduce a model that simultaneously rationalizes both deviations described above, while still postulating that voters are self-interested. This is done by assuming that voters' preferences toward redistribution are shaped not only by monetary payoffs, but also by *status-seeking* considerations.<sup>5</sup>

In our model, voters differ across two dimensions: *productivity* and *social class*. Productivity determines the voter's income and, ultimately, his level of consumption. Social class captures those factors that are associated with the voter's socioeconomic background and affect his social status even after controlling for the income effects they may entail. Examples

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<sup>3</sup>Other explanations for the support toward redistribution among the elites include pure warm-glow effects or the instrumental desire to keep the level of inequality in the society low to reduce the risk of revolutions against the status quo (Acemoglu and Robinson, 2000).

<sup>4</sup>Probabilistic voting models à la Dixit and Londregan (1998) could also generate both deviations from standard economic voting. However, this would be the result of exogenous shocks. Instead, in the framework analyzed in this paper, deviations from economic voting are related to measurable individual and societal parameters. This enables comparative statics and cross-country comparisons.

<sup>5</sup>Status-seeking behavior has been identified as an important driver of economic choices in many environments, including consumption choices (Hopkins and Kornienko, 2004), financial strategies (Barberis and Thaler, 2003), and engagement in prosocial activities (Bénabou and Tirole, 2006b).

include his cultural level or the social network that he inherits from his family (Lin, 1999). In line with standard indexes of socioeconomic status (Hollingshead, 2011), we assume that *social status* is a multidimensional attribute that is jointly determined by an individual’s level of consumption and social class.<sup>6</sup>

Formally, we define social status as a weighted average of the voter’s standing in the two dimensions and we assume that the larger the (positive or negative) distance between the voter’s relevant characteristics and the average levels in the population, the larger the (positive or negative) effects on his well-being. We thus follow the well-known “Keep up with the Joneses” formulation (Clark and Oswald, 1996; Hopkins and Kornienko, 2004). However, our model displays two distinguishing features. First, as already discussed, social status is a multidimensional attribute and, in each dimension, larger deviations from the average have a stronger impact on individual’s utility. This links our paper to the literature on salience in consumer’s choice (Bordalo et al. 2012, 2013), which postulates that attributes that stand out the most from the average have a larger impact on the utility of individuals. Second, we let the weights that define the relevance of consumption and social class to be endogenously determined by the distribution of voters’ characteristics in the society. In particular, as the dispersion in one of the two dimensions of heterogeneity increases, the weight associated to such dimension increases at the detriment of the weight of the other dimension. Put differently, the more disperse consumption (respectively, social class) is in the population, the more visible are the differences in relative consumption (social class), the larger is the relative impact that consumption (social class) has in determining social status. This assumption shares the same intuition underlying the literature on focusing (see Köszegi and Szeidl, 2013, Nunnari and Zápal, 2018, and the references therein) and, in the context of social concerns, is in line with the social rank hypothesis discussed in the

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<sup>6</sup>See Gilman (1981), Henrich and Boyd (2008) and Dow and Reed (2013) for historical and evolutionary arguments that testify the salience of social class in determining social status.

psychological and sociological literature (see Walasek and Brown, 2015, 2016 for evidence on the positive correlation between income inequality and status-seeking behavior). Finally, it is also coherent with the emerging literature on the causes and consequences of “status anxiety” (Wilkinson and Pickett, 2009; Layte, 2012; Layte and Whelan 2014; Delhey and Dragolov, 2014).

Because the dispersion of consumption in the society is affected by the tax rate, in our model taxation not only redistributes resources from the rich to the poor, but it also modifies the relative importance of the two dimensions of social comparison. Due to this latter effect, social elites (low social classes) may use taxation as a strategic tool to preserve the advantage (eliminate the disadvantage) they have in terms of social class. We label such strategic use of taxation *social-class voting*.

In line with this insight and with survey evidence reported in Section 2, our first set of results highlights how social concerns influence individual attitudes toward redistribution. We show that citizens’ preferred policy (i.e., their optimal tax rate) is monotonic in each of the two dimensions of social comparison separately: within any given social class, a voter’s preferred tax rate is decreasing in income; instead, for any given level of productivity, it is increasing in social class. Therefore, on the one hand, social comparisons over consumption amplify economic voting with low-income individuals demanding even higher levels of redistribution, while the opposite holds true for high-income individuals. On the other hand, due to comparisons over social class, social-class voting pushes individuals in high (low) classes to favor (oppose) raises in taxation. When status concerns over social class dominate those over consumption, affluent individuals in high social classes may support relatively high levels of redistribution. Interestingly, such support does not stem from fairness or altruistic considerations, neither it emerges as a form of noblesse oblige. Instead, it is purely strategic and self-interested, as it allows members of the social elite to differentiate themselves from

the nouveau riche. Symmetrically, individuals in low social classes with moderately low productivity may be less favorable to redistribution than what economic voting would dictate, in an attempt to boost the relevance of the dimension over which they have a comparative advantage. We also show that social concerns lead to an overall increase in the polarization of voters' preferences independently of which of the two dimensions of social comparisons (consumption or social class) receives the larger weight. More in general, our characterization allows comparative statics and cross-country comparisons that highlight the impact of social concerns and of heterogeneity in the electorate on individual preferences for redistribution.

We then study how individual preferences aggregate. To this goal, we show that in our model we can collapse one of the two dimensions of voters' heterogeneity and smoothly aggregate the preferences of the voters whose utility functions are strictly concave in taxation. As a result, we can characterize interclass coalitions of voters sharing the same preferred level of redistribution. These coalitions include relatively less productive voters in low social classes and relatively more productive voters in high social classes. When the relevance of social concerns is not too high, the structure of these coalitions and the dimensionwise monotonicity of individual preferences we described above, enable us to prove the existence of a unique political equilibrium in a Downsian model of electoral competition. The equilibrium tax rate is the Condorcet winner that emerges as the preferred tax rate of the decisive voter, namely a generic voter in the "median" coalition obtained after the collapse of one of the two dimensions of heterogeneity. We discuss how this tax rate varies with the overall importance of social concerns. Finally, we show that when the relevance of social concerns becomes too high, Condorcet cycles may emerge and a Downsian political equilibrium may fail to exist.

Our paper investigates the relationship between status-seeking behavior and preferences for redistribution. In this respect, it is related to recent papers by Levy and Razin (2015) and Koenig et al. (2017).

Levy and Razin (2015) study preferences for redistribution in a setting where individuals positively sort according to income. In their model, agents interact only with individuals that belong to the same “club”, with more prestigious clubs being more rewarding but also more costly to join (examples include the choice of a child’s school or the marriage market). When income inequality is high, individuals in the middle class have strong incentives to sort so to avoid mixing with the poor. Thus, to preserve the benefits of sorting, they may oppose redistribution despite having an income below the mean. At the opposite, when income inequality is low, the benefits from sorting are low too. As a result, middle class members may support higher redistribution even though their income may be above the average. Compared to Levy and Razin (2015), our model starts from similar premises: by decreasing income inequality, redistribution impacts on agents’ well-being not only because it affects their disposable income but also because it triggers some additional “social” effects. In Levy and Razin (2015), inequality modifies the incentives to sort; in our model, inequality affects the weights that define an agent’s social status. Differently from Levy and Razin (2015), we exploit multidimensional heterogeneity to show that the change in social weights can rationalize both deviations from economic voting simultaneously, within the same society and holding fixed the income distribution.

Koenig et al. (2017) study how status concerns may shape individual preferences about the provision of public good when a market alternative exists. In their setting, rich individuals support public provision to maintain the exclusivity of the private substitute and thus signal their social prestige. Our model is different from Koenig et al. (2017) in two respects. First, whereas Koenig et al. (2017) look at public good provision, we consider redistribution. Second, although in both models the coalition of voters supporting a given policy can be heterogeneous in terms of income, in our setting individuals with the same income may support different policies because of their social classes.



The paper is organized as follows. In Section 2, we provide some motivating evidence based on survey data. Section 3 introduces the model. Section 4 focuses on voters’ preferred tax rate. Section 5 studies the aggregation of preferences and the resulting political equilibrium. Section 6 concludes. Proofs are in the Appendix.

## 2. Motivating Evidence

As discussed in the Introduction, the literature (cf. footnote 2) has long recognized that income is not the only driver of agents’ preferences for redistribution. The same literature has also highlighted that voters’ attitudes towards redistribution and the actual size of redistributive policies are subject to large cross-country heterogeneity, in particular if one compares continental Europe with the US. In this paper we argue that social concerns in terms of consumption and social class may correlate with voters’ redistributive attitudes, hence with such cross-country heterogeneity.

To gather evidence on these correlations, we consider survey data from the European Social Survey (henceforth, ESS) and the General Social Survey (henceforth, GSS). The combined dataset covers 33 countries, including most European countries, Russia, Turkey, Israel and the United States. The Data Appendix provides details on the dataset and on the variables of interest.

Table 1 reports the results of a logit model in which we regress attitudes toward redistribution against several controls as well as country and year fixed effects. In the analysis, respondents are coded to be against redistribution if they disagree with the statement “Government should reduce differences in income levels”. Instead, we capture the relevance of social concerns with a dummy that equals 1 if the respondent thinks that it is important to be popular and admired.<sup>7</sup> To better highlight cross-country differences in the impact of

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<sup>7</sup>More precisely, the dummy variable *Social Concerns* equals 1 if a respondent in the GSS thinks that

social concerns, we present the results for three separate subsamples: Europe as a whole, Western Europe and US.<sup>8</sup> All our results get through also if we run the regression on the whole set of countries using properly defined dummy variables to account for continents' differences (see Table A3 in the Data Appendix).

Several patterns stand out. First, well-established empirical results (cf. Alesina and Giuliano, 2009) hold true even if we control for the importance of social concerns. Economic voting emerges in all models: rich individuals (variable *High Income* equal to 1) are more likely to oppose redistribution than poor individuals. Educational achievements of the respondent and of the father also reduce the support for redistribution (variables *High School*, *College*, *Father's High School* and *Father's College*). Insofar these variables are positively correlated with the respondent's lifetime income, this is additional evidence of economic voting.<sup>9</sup> Women are more favorable to redistribution than men, while working and married individuals tend to oppose it.<sup>10</sup> Not surprisingly, self-assessed political positioning—as measured by liberal and conservative dummies—is also correlated with redistributive preferences.<sup>11</sup>

Table 1 also shows how social concerns correlate with redistributive attitudes. Variables *Social Concerns* and *Social Concerns & High Income* imply that both in Europe and in the US, social concerns amplify economic voting and thus increase the polarization of redistribu-

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“to be well liked or popular” is one of the three most important aspects of life or if a respondent in the ESS agrees with the statement that “it is important to show abilities and to be admired”. The lack of similar questions in the World Value Survey impeded us to further expand the dataset.

<sup>8</sup>The reason to look at Western Europe in isolation is twofold. First, a large part of the literature about the “continent divide” in redistributive preferences compares Western Europe and the US. Second, the attitudes toward government intervention in Eastern European countries are likely to be affected by the historical role played by the Soviet Union and communism.

<sup>9</sup>Focusing on the US only, having a father who completed high school is positively correlated with being against redistribution, while the opposite holds true if the father completed college. Nonetheless, having a father who completed both high school and college remains positively correlated with being against redistribution.

<sup>10</sup>These last two patterns are statistically significant respectively in Europe and in the US; however, they also hold true in the entire dataset (see Table A3 in the Data Appendix).

<sup>11</sup>Table A3 in the Data Appendix also shows that, in line with the literature on the continental divide (see among others Piketty, 1995, Alesina and Angeletos, 2005, Bénabou and Tirole, 2006a), US respondents are more likely to oppose redistribution than Europeans.

**Table 1:** Logit regressions of preferences for redistribution.

	<b>Dependent Variable: Disagreement with “Gov’t should reduce differences in income levels”</b>						
	<i>Europe</i>	<i>Western Europe</i>	<i>US</i>	<i>Europe</i>	<i>Western Europe</i>	<i>US</i>	<i>US</i>
High Income	0.5007***	0.4911***	0.5586***	0.3935***	0.3871***	0.4786***	
Age	0.0032	0.0087	-0.0100	0.0156**	0.0221***	-0.0077	
Age <sup>2</sup>	-0.0001	-0.0001	0.0002	-0.0002***	-0.0003***	0.0002	
Female	-0.3918***	-0.4372***	-0.3753***	-0.3683***	-0.3860***	-0.3287***	
Married	-0.0056	0.0552	0.1692***	-0.0066	0.0378	0.0779**	
Working	0.1207***	0.0991***	0.0443	0.0746***	0.0614**	0.0333	
High School	0.2581***	0.2713***	0.4730***	0.0504	0.0965**	0.3572***	
College				0.4714***	0.4053***	0.3261***	
Father’s High School	0.3162***	0.3123***	0.1788***	0.1893***	0.1794***	0.2081***	
Father’s College				0.1958***	0.2111***	-0.0755*	
Social Concerns	-0.0092	0.0210	-0.3491*	-0.0217	0.0134	-0.3622*	
Social Concerns & High Income	0.0740**	0.1207***	0.2953*	0.0650*	0.1016**	0.3058*	
Social Concerns & High School	0.0320	0.0199	-0.0754	0.0166	-0.0168	-0.0530	
Social Concerns & College				-0.0007	0.0377	0.1446	
Social Conc. & Father’s High School	-0.0639*	-0.1175***	0.1579	-0.0650*	-0.0986**	0.0573	
Social Conc. & Father’s College				-0.0039	-0.0422	0.1238	
Liberal				-0.4901***	-0.5762***	-0.3430***	
Conservative				0.6236***	0.6997***	0.8592***	
Observations	140,303	88,946	16,354	140,303	88,946	16,354	

Data source: ESS and GSS. Notes: Estimated standard errors in parenthesis. \*\*\*=p-value<0.01, \*\*=p-value<0.05. Respondents belong to the age bracket 26-67. Country and Year fixed effects are included in all specifications.

tive preferences.<sup>12</sup> Moreover, consider the variable *Social Concerns & Father's High School*, which captures the interaction between the relevance that the respondent assigns to social concerns and the educational achievement of the father. Among European respondents this variable is correlated with support for redistribution (i.e., less disagreement with the statement in Table 1). Further controlling for the father's college education and the respondent's political positioning (columns 4 and 5) does not undermine this correlation. To the extent that parents' education influences the respondent's social standing even after controlling for income effects (say, it affects both income and social network or cultural level), we take this as evidence of social-class voting: redistribution receives stronger support among socioeconomic elites. The same pattern does not hold for the US. This is in line with the idea that social class-voting is more relevant in older and less mobile societies such as Europe (cf. Alesina and Angeletos, 2005), where for historical and cultural reasons the family background impacts significantly on individuals' socioeconomic status.

The fact that in our regressions we proxy the respondent's social class with the father's educational level deserves some further clarifications. The choice is grounded on the sociological literature showing that education is one of the main determinants of social standing (Hollingshead, 2011) and that such standing is, at least to some extent, transmitted across generations (Björklund and Jäntti, 2009, Black and Devereux, 2011). The reason we focus on the father's educational level as opposed to the respondent's one is twofold. First, the respondent's educational achievement is likely to depend on her skills and effort and the social status that it generates would then be less correlated with her social background. Second, the data show that 81.9% of the respondents completed high school, as opposed to 58.9% if one considers their fathers.<sup>13</sup> Thus, the completion of high school is likely to have a stronger

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<sup>12</sup>In particular, social concerns amplify the opposition to redistribution among high-income earners in Europe and strengthen the support for redistribution among low-income earners in the US.

<sup>13</sup>Splitting the data as in Table 1, the percentages become 85.9% vs. 71.3% in the US, 81.4% vs. 57.6% in Europe, and 79.5% vs. 55.9% in Western Europe.

impact on fathers' social class rather than on the respondents' one.

To sum up, social concerns appear to correlate with redistributive preferences in two separate and somehow opposite ways. If interacted with the economic status of the respondent, they strengthen economic voting. This channel is active both in Europe and in the US, suggesting that social concerns in the consumption dimension are relevant in both locations. The interaction of social concerns with the respondent's social background instead shows that members of high social classes tend to favor redistributive policies more than those who belong to low social classes. This second channel appears to be relevant only in Europe, namely in a less mobile society where family background is still an important determinant of an individual's social status.<sup>14</sup>

### 3. The Model

A society is made by a unit mass of citizens. Citizens are heterogeneous in two dimensions: *productivity* and *social class*. Productivity is represented by the parameter  $\theta \in [\theta_{min}, \theta_{max}] = \Theta \subseteq [0, \infty)$ . Social class is represented by the parameter  $k \in [k_{min}, k_{max}] = K \subseteq [0, \infty)$ . As explained in the Introduction, a citizen's social class captures the set of socioeconomic characteristics that affect the individual's social standing even after controlling for his productivity/income, for instance the social capital he inherited from his parents.<sup>15</sup>

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<sup>14</sup>In the Data Appendix, we show that the same patterns hold true also if we define as high-income earners individuals that are substantially above the median (Table A4). Moreover, we also show that among European respondents the correlation between preferences for redistribution and the interaction of social concerns and income can be attributed to social concerns in the consumption dimension, while the one between preferences for redistribution and the interaction of social concerns and social background cannot (Table A5). This suggests that the various dimensions of social status may impact preferences for redistribution differently as our model shows. The lack of suitable variables in the GSS prevents us from extending this analysis to US respondents.

<sup>15</sup>Although we consider social class as the second dimension of heterogeneity, our model is general enough to potentially accommodate other characteristics. Examples may include age, IQ, health, ethnicity, height, beauty. See Persson and Tabellini (2002) for a model in which age, together with income, influences preferences for redistribution. For these alternative characteristics to be socially valuable, they must be publicly observable or easily inferable. Moreover, to fit into our model, they should also be exogenous and the government should be unable to tax them directly. We focus on social class both because of its importance in determining social status (see the references in footnote 6), and because some of these other factors can be incorporated in our definition of social class.

Each citizen is thus characterized by the pair  $(\theta, k) \in \Theta \times K = T$ , which we refer to as the citizen's *type*. Types are distributed in the population according to the joint cumulative density function  $F(\theta, k)$ , with pdf  $f(\theta, k)$ , that we assume to be positive for all  $(\theta, k)$ . Let  $\bar{\theta}$  and  $\theta^m$  denote the average and the median productivity in the population. Similarly, let  $\bar{k}$  and  $k^m$  denote the average and the median social class. In line with the literature and the empirical evidence, we assume that  $\theta^m < \bar{\theta}$ .

Citizens inelastically supply one unit of labor in a perfectly competitive labor market. Labor yields an output equal to the citizen's productivity and the price of such output is normalized to 1. Then, in exchange of his labor, type  $(\theta, k)$  receives a wage equal to  $\theta$ .

The government taxes income through a proportional tax rate  $\tau \in [0, 1]$ . Tax revenues are then used to finance the provision of a lump-sum monetary transfer  $g$  to all citizens. Borrowing is not allowed. Therefore, the tax rate  $\tau$  and the transfer  $g$  must satisfy the budget constraint:  $g \leq \tau \bar{\theta}$ .

The *level of consumption* of type  $(\theta, k)$  and the *average level of consumption* in the population are thus respectively given by:

$$c(\tau, g \mid \theta, k) = (1 - \tau) \theta + g; \quad (1)$$

$$\bar{c}(\tau, g) = (1 - \tau) \bar{\theta} + g. \quad (2)$$

Taxes have distortionary effects that negatively affect all citizens. Formally, these distortions are captured by a strictly increasing and strictly convex function,  $\ell : [0, 1] \rightarrow \mathbb{R}_+$ , which we assume to be sufficiently convex to guarantee that, absent social concerns (see below), all voters have a preferred level of taxation below one.<sup>16</sup> Although these distortions can be microfounded by modeling individuals' labor/leisure decisions,<sup>17</sup> we model them through

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<sup>16</sup>Formally, we assume  $d\ell(0)/d\tau = 0$  and  $d\ell(1)/d\tau > \bar{\theta} - \theta_{min}$ . All our insights would go through if distortions increase with individuals' productivity.

<sup>17</sup>In such microfoundation, taxation would generate both a substitution effect due to the change in the

function  $\ell$  in order to focus on the effects of social concerns on redistributive preferences, rather than on the inefficiencies that redistribution creates. If tax distortions were absent, we could still characterize agents' preferred tax rates (see Section 4). However, the aggregation of individual preferences would not generalize (see Section 5).

The *consumption* utility of individuals is given by:

$$u(\tau, g \mid \theta, k) = (1 - \tau)\theta + g - \ell(\tau). \quad (3)$$

Importantly, citizens care not only about their consumption utility, but also about their *social status*. A citizen's social status is determined by his standing in terms of consumption and social class. In particular, the social status of an individual with type  $(\theta, k)$  is captured by the function  $S(c - \bar{c}, k - \bar{k}) : \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$ , which is strictly increasing in both its arguments and such that  $S(0, 0) = 0$ . Intuitively, the social status of an individual is higher (lower), the larger is the positive (negative) gap between the agent's attributes (his level of consumption and his social class) and the average values in the population.<sup>18</sup> Then:

$$S(c - \bar{c}, k - \bar{k}) = \eta \cdot (W_c \cdot (c - \bar{c}) + W_k \cdot (k - \bar{k})). \quad (4)$$

The parameter  $\eta \geq 0$  captures the overall importance of social status considerations, while  $W_c \in [0, 1]$  and  $W_k \in [0, 1]$  denote the relative weights of consumption and social class in determining status.

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cost of one unit of consumption in terms of leisure and an income effect due to the change in the total value of the individual's time endowment. Aggregate distortions from taxation would then require substitution effects to be stronger than income effects, or, equivalently, aggregate labor supply to adjust negatively to an increase in taxation.

<sup>18</sup>We thus assume that social status depends in a cardinal way on an individual's standing. A similar formulation appears, among others, in Cooper et al. (2001), Bowles and Park (2005), and Gallice and Grillo (2018). An alternative approach assumes that status depends in an ordinal way on an individual's relative standing (see for instance, Hopkins and Kornienko, 2004, and Becker et al., 2005). The two approaches may lead to different implications (see Clark and Oswald, 1998, for differences in the attitudes towards emulation and deviance, or Bilancini and Boncinelli, 2012, for differences in the impact of redistributive policies and the relevance of social waste when status is determined by the consumption of a conspicuous good).

In line with the literature linking income inequality, status-seeking behavior and status anxiety (cf. Introduction) and similarly to the approach used in recent models of focusing (Kőszegi and Szeidl, 2013; Nunnari and Zápal, 2018), we let  $W_c$  and  $W_k$  be increasing in the dispersion of the relevant variable. As a measure of dispersion, we use the standard deviation.<sup>19</sup> Thus, as the standard deviation in consumption levels widens (respectively, shrinks), the importance of consumption in determining the agent’s overall status increases (respectively, decreases). The same is true for social class. Formally:

$$W_c(\sigma_c, \sigma_k) = \frac{\sigma_c}{\sigma_c + \lambda\sigma_k}, \quad W_k(\sigma_c, \sigma_k) = \frac{\lambda\sigma_k}{\sigma_c + \lambda\sigma_k}, \quad (5)$$

where  $\sigma_c$  is the standard deviation of consumption in the population,  $\sigma_k$  is the standard deviation of social class in the population, and  $\lambda > 0$  is a rescaling factor that makes the two standard deviations comparable. Our analysis goes through if we assume other functional forms for the social weights as long as an increase in the dispersion in one dimension has the joint effect of increasing the weight on such dimension and decreasing the weight on the other dimension.<sup>20</sup>

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<sup>19</sup>To model focusing, Kőszegi and Szeidl (2013) postulate that the weight that a consumer attaches to a certain attribute is increasing in the range of the consumption utility that the various alternatives generate with respect to such attribute. In our model, weights are not mediated by consumption utility and they are increasing in the standard deviation, rather than in the range. As we model social standings using distance from the first moment in the population, it is somehow natural to measure dispersion using a function of the second moment (the actual choice of standard deviation as opposed to variance or to the second moment itself is done for analytical tractability). Moreover, the standard deviation depends on the density of the distribution; thus, we think that it is better suited to handle a model with a continuum of individuals, whose characteristics are distributed according to some cumulative density function.

<sup>20</sup>Our model also shares some similarities with models of salience in consumer’s choice à la Bordalo et al., (2012, 2013). Indeed, both approaches assume a positive relation between the degree with which a certain characteristic/dimension stands out and their impact on the utility of individuals. However, differently from salience, we let the strength of such relation be a smooth function of the relative dispersion of each characteristic in the population—see (5)—which is affected by the policy variable  $\tau$ . This enables us to study the effects of social concerns on individuals’ preferences for redistribution.



## 4. Social Concerns and Individual Preferences

A citizen's *total utility* is given by the sum of consumption utility and status-seeking considerations. Formally, the utility of type  $(\theta, k)$  is given by:

$$\begin{aligned} v(\tau, g \mid \theta, k) &= u(\tau, g \mid \theta, k) + S(c - \bar{c}, k - \bar{k}) = \\ &= (1 - \tau)\theta + g - \ell(\tau) + \eta \left( \frac{(1 - \tau)^2 \sigma_\theta}{(1 - \tau)\sigma_\theta + \lambda\sigma_k} (\theta - \bar{\theta}) + \frac{\lambda\sigma_k}{(1 - \tau)\sigma_\theta + \lambda\sigma_k} (k - \bar{k}) \right). \end{aligned} \quad (6)$$

Policies  $(\tau^*(\theta, k), g^*(\theta, k))$  maximize (6) subject to  $g \leq \tau\bar{\theta}$  and thus constitute the preferred policies of the voter  $(\theta, k)$ .<sup>21</sup> Obviously, such policies satisfy the budget constraint with equality. Thus, from now on, we will focus on the optimal tax rate,  $\tau^*(\theta, k)$ , only.

In what follows, it is convenient to rescale types so that they represent distances from the population averages. Thus, each voter  $(\theta, k)$  is identified by  $(\theta_d, k_d) = (\theta - \bar{\theta}, k - \bar{k})$ . We denote the joint distribution of  $(\theta_d, k_d)$  with  $F_d(\theta_d, k_d)$ , its pdf with  $f_d(\theta_d, k_d)$ , the rescaled supports with  $[\theta_{d,min}, \theta_{d,max}]$  and  $[k_{d,min}, k_{d,max}]$  and the rescaled median productivity with  $\theta_d^m$ . We can then classify citizens in four different groups:

- i. The *working class*. These are voters who are below the average both in terms of productivity and social class,  $\theta_d \leq 0$  and  $k_d \leq 0$ .
- ii. The *nouveau riche*. These are voters who are more productive than the average, but belong to low social classes,  $\theta_d > 0$  and  $k_d \leq 0$ .
- iii. The *new poors*. These are voters who are less productive than the average, but belong to a relatively high social class,  $\theta_d \leq 0$  and  $k_d > 0$ .

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<sup>21</sup>It is immediate to verify that  $\tau^*(\theta, k)$  is non-empty, compact and upperhemicontinuous. When  $\tau^*(\theta, k)$  is a singleton, we abuse notation and write  $\tau^*(\theta, k)$  to denote its unique value. Moreover, to simplify the exposition, we assume that the set of maximizers is a singleton for all voters. None of the results we provide hinges on this simplification.

- iv. The *elite*. These are voters who are above the average both in terms of productivity and social class,  $\theta_d > 0$  and  $k_d > 0$ .

Substituting for the government's budget constraint, we can compute the effect of a change in the level of redistribution (as measured by the size of  $\tau$ ) on the utility of type  $(\theta_d, k_d)$  as follows:

$$\frac{\partial v(\tau, \bar{\theta} \mid \theta_d, k_d)}{\partial \tau} = \underbrace{-\theta_d - \frac{d\ell(\tau)}{d\tau}}_{\text{economic voting}} + \underbrace{\eta\sigma_\theta \cdot \frac{\lambda\sigma_k k_d - (1-\tau)((1-\tau)\sigma_\theta + 2\lambda\sigma_k)\theta_d}{((1-\tau)\sigma_\theta + \lambda\sigma_k)^2}}_{\text{impact of social concerns}}. \quad (7)$$

Two forces are at play in (7). The first force captures economic voting and does not depend on social concerns: an increase in the level of taxation benefits individuals whose income is below average ( $\theta_d < 0$ ), as what they pay is less than what they get, and harms those whose income is above average ( $\theta_d > 0$ ), as what they pay is more than what they get. Furthermore, the distortionary effect of taxation pushes against high levels of taxation. The second force captures the impact of social concerns. Since an increase in taxation reduces the dispersion in net income, it reduces the standard deviation of consumption. As such, it decreases the relevance of consumption and increases the relevance of social class in determining an individual's status. This may benefit or harm the individual depending on his position in the two dimensions. The effect is certainly negative for the *nouveau riche* and certainly positive for the *new poor*s. In the remaining two groups (the working class and the elite), the effect can go in either direction depending on which of the two dimensions the agent stands out the most. If it is consumption (namely, if the absolute value of  $\theta_d$  is sufficiently larger than the one of  $k_d$ ), social concerns amplify economic voting: low productive individuals in the working class prefer even higher redistribution, while high productive individuals in the elite more strongly oppose it. Instead, if social class stands out (i.e., the absolute value of  $k_d$  is sufficiently larger than the one of  $\theta_d$ ), *social-class voting*

emerges: members of the working class (elite) support lower (higher) levels of redistribution in order to overcome their disadvantage (protect their advantage) in terms of social class.

The citizen's relative standing in the two dimensions of social comparison also affects the concavity or convexity of his utility function with respect to taxation:

$$\frac{\partial^2 v(\tau, \tau \bar{\theta} \mid \theta_d, k_d)}{\partial \tau^2} = \underbrace{-\frac{d^2 \ell(\tau)}{d\tau^2}}_{\text{tax distortions}} + \underbrace{2\eta \sigma_\theta \lambda \sigma_k \cdot \frac{\lambda \sigma_k \theta_d + \sigma_\theta k_d}{((1-\tau) \sigma_\theta + \lambda \sigma_k)^3}}_{\text{impact of social concerns}}. \quad (8)$$

Consider first a situation in which taxes are not distortionary (i.e.,  $\ell(\tau) \equiv 0$ ). Then, the sign of (8) would be determined by the sign of the second term, so that the utility function would be concave for members of the working class and convex for members of the elite. For the nouveau riche and the new poors, it could be either convex or concave.<sup>22</sup> Starting from this baseline, tax distortions introduce concavity with respect to taxation. In Section 5, we exploit this fact to aggregate individual preferences.

We can now characterize the preferred level of taxation of generic type  $(\theta_d, k_d)$ . As a first step, consider the limit case in which social concerns do not exist ( $\eta = 0$ ). Individuals then follow pure economic voting and trade-off their private marginal benefit from the redistributive scheme against marginal tax distortions. We refer to this situation as the benchmark case, indexed by  $B$ .

**Remark 1.** *If social concerns do not exist ( $\eta = 0$ ), then a voter's optimal tax rate is given by  $\tau_B^*(\theta_d, k_d) = \tau_B^*(\theta_d) = \max \{0, d\ell^{-1}(-\theta_d)/d\tau\}$ .*

Now consider the case in which social concerns exist ( $\eta > 0$ ). Agents' preferred level of taxation is then shaped by both economic voting and social-class voting. Our first result

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<sup>22</sup>More precisely, the function is convex (concave) if and only if the "standardized" advantage that agents enjoy in one dimension is stronger (weaker) than the "standardized" disadvantage they suffer in the other. Formally, the function is convex if and only if  $\theta_d/\sigma_\theta > k_d/(\lambda \sigma_k)$  and concave if and only if  $\theta_d/\sigma_\theta \leq k_d/(\lambda \sigma_k)$ .

shows that a citizen's preferred policy is monotonic in each of his characteristics separately. Thus, within a given social class, standard economic voting holds: more productive individuals want lower levels of redistribution. Similarly, holding productivity (and thus income) fixed, social-class voting holds: individuals in higher social classes are more favorable to redistribution.

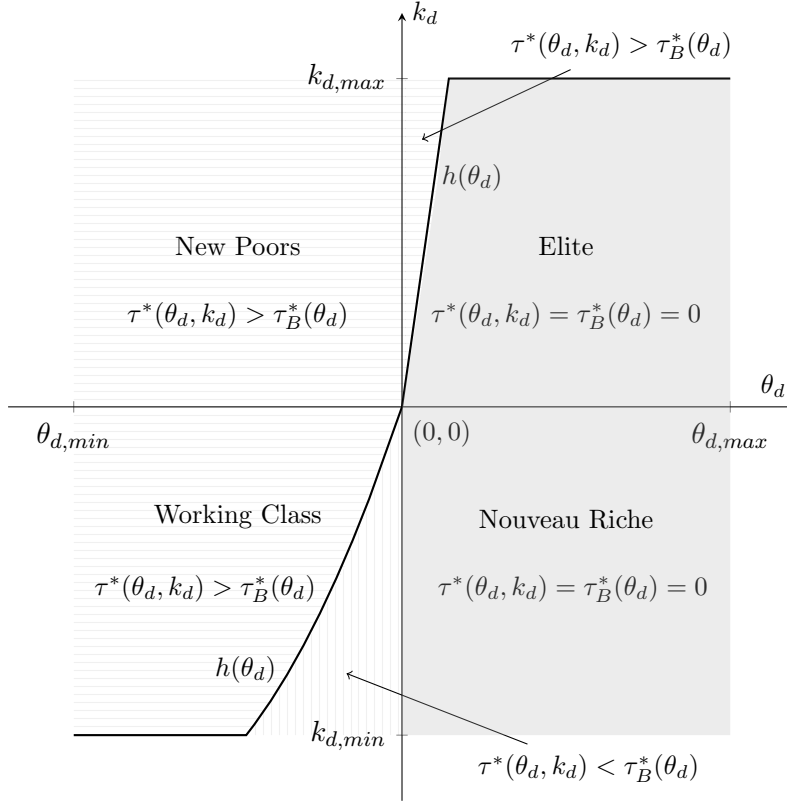
**Proposition 1.**  $\tau^*(\theta_d, k_d)$  is non-increasing in  $\theta_d$  for every  $k_d$  and non-decreasing in  $k_d$  for every  $\theta_d$ .<sup>23</sup>

Proposition 1 enables us to characterize agents' preferred level of taxation and study how social concerns affect it. In the interest of clarity, we focus on each of the four groups separately. Figure 1 illustrates the results for the special case in which  $\ell(\tau) = \tau^2$ .

**Working Class.** Since  $\theta_d \leq 0$  and  $k_d \leq 0$ , the utility function of any voter in this class is strictly concave in taxation—see (8). Then, even in the presence of social concerns,  $\tau_B^*(\theta_d)$  (cf. Remark 1) remains the unique optimal tax rate for all those voters for whom the last term in (7) is equal to 0. We can thus define a function  $h : [\theta_{d,min}, 0] \rightarrow [k_{d,min}, 0]$  that splits working-class voters in three groups, depending on how their preferred tax rate compares with  $\tau_B^*(\theta_d)$ .<sup>24</sup> Individuals  $(\theta_d, h(\theta_d))$  have a preferred tax rate exactly equal to  $\tau_B^*(\theta_d)$ . Proposition 1 then implies that individuals  $(\theta_d, k_d)$  with  $k_d > h(\theta_d)$  have a preferred level of taxation higher than the one in the benchmark model. For these agents—highlighted with horizontal lines in Figure 1—social concerns reinforce economic voting. On the contrary, individuals  $(\theta_d, k_d)$  with  $k_d < h(\theta_d)$  have an optimal tax rate that is lower than the benchmark. The preferences of these voters—highlighted with vertical lines in Figure 1—are mostly driven by social-class voting: they support little redistribution to reduce the

<sup>23</sup>These relationships are strict whenever the optimal tax rate is in the interior of  $[0, 1]$ . The same is true for all subsequent propositions.

<sup>24</sup>Formally,  $h(\theta_d) = \max \{ (1 - \tau_B^*(\theta_d)) ((1 - \tau_B^*(\theta_d)) \sigma_\theta + 2\lambda\sigma_k) \theta_d / (\lambda\sigma_k), k_{d,min} \}$ . It is immediate to check that  $h(0) = 0$  and the function is increasing.



**Figure 1.** The effect of social concerns on agents' preferred tax rate.

prominence of their low social class.

**Nouveau riche.** For these voters social concerns unambiguously push against redistribution. Indeed, taxation simultaneously decreases the relevance of consumption (the dimension over which these individuals are strong) and increases the relevance of social class (the dimension over which they are weak). As a result, the optimal tax rate for these individuals is equal to 0 and coincides with the one of the benchmark model.

**New poors.** For these voters, the situation is opposite to the one of the nouveau riche. Thus, they support higher tax rates than in the benchmark model.

**Elite.** Also within the elite, we can define a function  $h : (0, \theta_{d,max}] \rightarrow (0, k_{d,max}]$  that splits voters on the basis of how social concerns impact on their redistributive preferences.<sup>25</sup> Voters  $(\theta_d, k_d)$  with  $k_d \leq h(\theta_d)$ —highlighted in grey in Figure 1—have a preferred tax rate equal to zero, identical to the one in the benchmark model. Instead, voters  $(\theta_d, k_d)$  with  $k_d > h(\theta_d)$  have an optimal tax rate that is strictly positive. For these latter individuals—highlighted with horizontal lines in Figure 1—social-class voting dominates: despite being net losers from the redistributive scheme, they support a positive taxation to preserve their advantage in terms of social class.

The next proposition summarizes the effect of social concerns on voters’ preferred tax rate and describes some properties of function  $h$ .

**Proposition 2.** *Let  $\eta > 0$ . There exists a weakly increasing function  $h : [\theta_{d,min}, \theta_{d,max}] \rightarrow [k_{d,min}, k_{d,max}]$  such that: (i)  $h(0) = 0$ , (ii)  $h(\theta_d)$  is constant in  $\eta$  if  $\theta_d \leq 0$ , and non-increasing in  $\eta$  if  $\theta_d > 0$ , (iii) for any  $\theta_d \in [\theta_{d,min}, 0]$ ,  $\tau^*(\theta_d, k_d)$  is non-decreasing in  $\eta$  if  $k_d \geq h(\theta_d)$  and non-increasing in  $\eta$  otherwise, and (iv) for any  $\theta_d \in (0, \theta_{d,max}]$ ,  $\tau^*(\theta_d, k_d)$  is non-decreasing in  $\eta$ .*

Proposition 2 (and Figure 1) can also guide some cross-country comparisons whose results are in line with the motivating evidence discussed in Section 2. Consider for instance two countries A and B that are similarly heterogeneous in terms of productivity (hence, income). However, in country A social classes do not play much of a role. This could be the case for “young” countries in which social stratification based on inherited background is not particularly strong (e.g., the US). Our model dictates that in country A the main driver of social status is income. Figure 1 then shows that if the vast majority of voters concentrates

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<sup>25</sup>The analysis differs from the one carried out for the working class in two dimensions. First, if social concerns are absent, the optimal tax rate of voters in the elite is equal to zero; thus, social concerns can only (weakly) raise their preferred taxation. Second, the utility function of individuals in the elite is not necessarily concave in taxation and thus function  $h$  must be defined differently. See the proof of Proposition 2 for details.

around the x-axis, both the elite and the working class are highly homogeneous in their redistributive preferences. The elite is solidly against taxation, whereas the working class is largely in favor of it. In other words, and as already discussed, social concerns amplify economic voting and the latter describes the behavior of the large majority of the population.

Suppose instead that in country B social stratification has a longer tradition and it is thus more important (e.g., Europe). Voters thus spread out more evenly across the two dimensions. In Figure 1, this corresponds to a situation in which a significant mass of voters concentrates around the y-axis as well. Then, in country B, social-class voting should be a more relevant phenomenon and a sizable fraction of individuals with high social background should support redistribution.<sup>26</sup>

On a similar vein, we can also perform cross-country comparisons with respect to the relevance of social status considerations,  $\eta$ . Let countries C and D be identical in the distribution of types, but say that status concerns are more relevant in country C than in country D. Point (ii) in Proposition 2 indicates that the fraction of the working class that engages in social-class voting would be the same in both countries, whereas the fraction of the elite that follows social-class voting would be (weakly) larger in country C. Moreover, as highlighted by points (iii) and (iv) in Proposition 2, a change in  $\eta$  also modifies voters' optimal tax rate. In particular, and referring to Figure 1, any voter in the area highlighted with vertical (horizontal) lines of country C has a lower (higher) preferred tax rate than the same citizen in country D. As a result, the sorting of voters based on their income along the traditional redistribution cleavage will be more noisy in country C than in country D.<sup>27</sup>

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<sup>26</sup>Applying a symmetric argument, a mean preserving spread of the distribution of productivity holding fixed the level of social stratification would amplify economic voting. Instead, shocks that shift the entire distribution of productivity have no consequences on individual preferences as the latter are determined by the voter's relative position in the society, which remains unaffected.

<sup>27</sup>All these cross-country comparisons, as well as the the results concerning polarization discussed below (cf. Proposition 3), provide testable implications about the relationships linking redistributive preferences with social concerns and measures of dispersion in the population. These implications also distinguish our paper from models à la Dixit and Londregan (1998), where deviations from economic voting are due to exogenous shocks.

Because social concerns affect voters' preferred level of taxation, they also impact on the level of *polarization* of redistributive preferences. Let polarization be given by the difference between the average preferred tax rate of the voters who are more favorable to redistribution —the new poor— and the average preferred tax rate of the voters who more strongly oppose it —the nouveau riche:<sup>28</sup>

$$\Pi = \int_0^{k_{d,max}} \int_{\theta_{d,min}}^0 \tau^*(\theta_d, k_d) f_d(\theta_d, k_d) d\theta_d dk_d - \int_{k_{d,min}}^0 \int_0^{\theta_{d,max}} \tau^*(\theta_d, k_d) f_d(\theta_d, k_d) d\theta_d dk_d. \quad (9)$$

**Proposition 3.** *Polarization is weakly increasing in  $\eta$ . Furthermore, it is weakly increasing in  $\sigma_\theta$  (weakly decreasing in  $\sigma_k$ ) if  $\sigma_\theta < \lambda\sigma_k$ .*

The first part of Proposition 3 follows from Proposition 2: when the relevance of social concerns goes up, new poors want higher levels of redistribution, while the nouveau riche still support no redistribution (see Figure 1). Thus, polarization goes up.

The second part of Proposition 3 further says that polarization is increasing in the dispersion in productivity (hence, income) when such dispersion is not too high. However, when the standard deviation in productivity becomes larger than the one in social class, such relationship does not necessarily hold. To gain intuition, observe that an increase in  $\sigma_\theta$  affects preferences for redistribution only through status-seeking considerations. In particular, we can identify two effects. On the one hand, weight  $W_c$  goes up, reinforcing economic voting. This pushes polarization up. On the other hand, weight  $W_k$  decreases and thus social-class voting becomes less important. Because social-class voting is one of the reasons pushing the new poors to support redistribution, this second effect may lead to a decrease in their

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<sup>28</sup>To simplify notation, the following expression assumes that the new poor have a unique preferred tax rate. See the proof of Proposition 3 for an exact definition. Other definitions of polarization are possible. For instance, one could consider the difference between the average preferred tax rate in the  $x$ th percentile of most productive voters and the average preferred tax rate in the  $x$ th percentile of least productive voters. In this case, the results of Proposition 3 would hold true if, given distribution  $F_d(\theta_d, k_d)$ , the former group of voters is sufficiently concentrated in the region highlighted with horizontal lines in Figure 1, and the latter in the remaining regions. In turn, this would be the case if the marginal distribution of productivity,  $F_\theta(\theta)$ , is not excessively left-skewed.



preferred level of taxation, hence polarization. If  $\sigma_\theta$  is large, the second effect can dominate and the overall effect on polarization can become negative.

The results in Proposition 3 can be related to the growing literature linking political polarization with measures of inequality (McCarty et al., 2006; Voorheis et al., 2015). The majority of these studies identifies a positive correlation between these two variables, which is compatible with our model. Nonetheless, Pontusson and Rueda (2008) points at large cross-country heterogeneity in this correlation. Furthermore, focusing on preferences concerning redistribution and welfare spending, Barth et al. (2015) find that inequality has no effect on polarization, while Haggard et al. (2013) show that in developing countries higher levels of inequality may even decrease the demand for redistribution and thus dampen polarization. Proposition 3 suggests that this cross-country heterogeneity could be explained through the lenses of our model by the two opposing channels we just described.

## 5. Interclass Coalitions and Aggregation of Preferences

In Section 4 we showed that social concerns introduce disagreement among voters who have the same productivity but belong to different social classes. In spite of this heterogeneity, our model allows for a smooth aggregation of individual preferences within the working class. The intuition is as follows (we present the formal argument in the Appendix). Let  $\tau^*(\theta_d, k_d) \in (0, 1)$  be the preferred tax rate of a given voter  $(\theta_d, k_d)$  in the working class. Exploiting the optimality condition of other voters in the working class—(7) equal to 0—we can define a set of voters whose preferred tax rate coincides with  $\tau^*(\theta_d, k_d)$ . These voters have types  $(\vartheta(\theta_d, k_d, k'_d), k'_d)$ , where

$$\vartheta(\theta_d, k_d, k'_d) = \theta_d + Q(\theta_d, k_d)(k'_d - k_d) \quad (10)$$

and function  $Q$  is given by

$$Q(\theta_d, k_d) = \frac{\eta\sigma_\theta\lambda\sigma_k}{(1+\eta)[(1-\tau^*(\theta_d, k_d))\sigma_\theta + \lambda\sigma_k]^2 - \eta\lambda^2\sigma_k^2}. \quad (11)$$

Hence,  $\vartheta$  identifies the *interclass coalition* of voters in the working class, whose preferred tax rate is  $\tau^*(\theta_d, k_d)$ .<sup>29</sup> In this respect,  $Q$  measures the marginal adjustment in the productivity dimension needed to compensate for a marginal change in social class and guarantee that the optimal tax rate does not change. Hence, it measures the heterogeneity in the productivity levels of the members of the coalition. If  $Q$  is small, the set of voters who share the same preferred tax rate is relatively homogeneous in terms of productivity. In contrast, if  $Q$  is large, the coalition includes voters with heterogeneous productivity levels. Moreover, since  $Q \geq 0$ , the coalition includes relatively less productive individuals in low social classes and relatively more productive individuals in high social classes. It is worthwhile to point out that coalitions are heterogeneous in terms of productivity even if productivity is identically distributed across all classes. In other words, the heterogeneity in interclass coalitions does not stem from the correlation between productivity and social class, but from the existence of social concerns.

As we change the relevance of social concerns, the composition of coalitions changes in two ways: directly, because  $Q$  depends on  $\eta$ , and indirectly, because  $Q$  depends on  $\tau^*$ , which, in turn, depends on  $\eta$ . The former mechanism implies a positive correlation between the importance of social concerns and the heterogeneity of interclass coalitions. This happens because, as the importance of social concerns increases, voters with productivity below the average suffer more from comparisons in terms of consumption; hence, a larger increase in productivity is needed to compensate for an increase in social class, and keep the preferred

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<sup>29</sup>As we vary  $k'_d$ ,  $\vartheta$  may fall outside the working class, i.e.  $\vartheta \notin [\theta_{d,min}0]$ . In this case, the voter does not belong to the interclass coalition. This turns out to be irrelevant in our discussion.

tax rate constant. The latter channel, instead, is driven by the fact that a change in the importance of social concerns modifies the optimal tax rate of voters who belong to the same coalition differently depending on their actual types.<sup>30</sup> This leads to a change in the composition of coalitions, hence in their heterogeneity in terms of productivity.

Despite the potential indeterminacy that these two channels can generate, if the social class of a voter is sufficiently high, the heterogeneity in productivity levels within a coalition unambiguously widens as the relevance of social concerns increases.

**Proposition 4.** *Let  $(\theta_d, k_d)$  be a voter in the working class and suppose that  $k_d \geq h(\theta_d)$ . Then,  $Q(\theta_d, k_d)$  is increasing in  $\eta$ .*

Interclass coalitions can be easily constructed within the working class because the concavity of the utility function implies a unique optimal tax rate, which can be characterized by the first-order condition. When we move out from the working class, voters' utility functions may no longer be strictly concave in  $\tau$ ; hence, the optimal tax rate may not be unique and the first order condition may not identify it (see Example 1 below). Nonetheless, in the benchmark model in which  $\eta = 0$ , deadweight losses from taxation guarantee that the preferred tax rate of any voter with productivity lower or equal than the mean satisfies the first-order condition

$$\varphi(\tau, \theta_d, k_d) := \frac{\partial v(\tau, \tau\bar{\theta} \mid \theta_d, k_d)}{\partial \tau} = 0. \quad (12)$$

Moreover, because  $Q \equiv 0$ , interclass coalitions are homogeneous in terms of productivity, namely  $\vartheta(\theta_d, k_d, k'_d) = \theta_d$ .

By continuity, if we pick any voter with productivity strictly below the mean, we can find values of  $\eta$  small enough to guarantee that (12) still identifies the agent's unique optimal tax rate. In other words, as long as the relevance of social concerns is not too high, we can define

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<sup>30</sup>To see this, it is sufficient to apply the implicit function theorem to (7) after setting it equal to 0.

interclass coalitions that span all productivity levels below the average. Then, for any voter  $(\theta_d, k_d)$  with productivity below the average, we can use Proposition 1 and the definition of interclass coalitions to collapse one of the two dimensions of voters' heterogeneity (namely, the social class dimension) and split the population in two groups: voters whose preferred tax rate is higher than  $\tau^*(\theta_d, k_d)$  and voters whose preferred tax rate is lower than  $\tau^*(\theta_d, k_d)$ . Under the same conditions, Proposition 4 extends as well.

Because the median productivity is lower than the average productivity, we can apply standard results in this unidimensional space and characterize the unique political equilibrium of a Downsian model of electoral competition in which two candidates announce a vector of policies  $(\tau, g)$  under the constraint  $g = \tau\bar{\theta}$ . This equilibrium involves both candidates announcing the preferred tax rate of the “median voter” in the unidimensional space. This tax rate is the Condorcet winner and we denote it  $\tau^{VE}$ .<sup>31</sup>

To formalize this argument, for any voter in the working class  $(\theta_d, k_d)$  define:

$$\psi(\theta_d, k_d) = \int_{k_{d,min}}^{k_{d,max}} \int_{\theta_{d,min}}^{\vartheta(\theta_d, k_d, y)} f_d(x, y) dx dy. \quad (13)$$

Function  $\psi$  measures the mass of the electorate with preferred tax rate above the one of such working class voter. The equilibrium tax rate of the political game coincides with the preferred tax rate of any type  $(\theta_d, k_d)$  for which  $\psi(\theta_d, k_d) = 1/2$ . This last equation identifies *decisive voters*  $(\theta_d, k_d)$ : half of the electorate has a preferred tax rate greater or equal than the one of decisive voters and the opposite is true for the other half.<sup>32</sup> This coalition of decisive voters plays the same role of the median voter in a setting in which voters heterogeneity is unidimensional. Within this coalition, and with no loss of generality, we identify as a specific

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<sup>31</sup>Consider any pair of announcements by politicians in which at least one of the two tax rates is not  $\tau^{VE}$ . Then, any candidate who is winning with probability lower than 1 (such candidate must exist and cannot be already announcing  $\tau^{VE}$ ) could deviate to  $\tau^{VE}$  and be strictly better off. We conclude that none of these profiles of policy announcements can be an equilibrium of the political game.

<sup>32</sup>Obviously, if  $\psi(\theta_d^*, k_{d,min}) = 1/2$ , then  $\psi(\vartheta(\theta_d^*, k_{d,min}, k'_d), k'_d) = 1/2$  for any  $k'_d$ . This indeterminacy does not play any role in our analysis.

decisive voter the agent in the lowest possible social class. We denote him by  $(\theta_d^*, k_{d,min})$ .

**Proposition 5.** *There exists  $\bar{\eta} > 0$  such that, if  $\eta \leq \bar{\eta}$ , the equilibrium tax rate  $\tau^{VE}$  is unique and coincides with the preferred tax rate of the decisive voter  $(\theta_d^*, k_{d,min})$ . Thus,  $\tau^{VE}$  and  $(\theta_d^*, k_{d,min})$  jointly satisfy the system:*

$$\varphi(\tau^{VE}, \theta_d^*, k_{d,min}) = 0 \quad (14)$$

$$\psi(\theta_d^*, k_{d,min}) - \frac{1}{2} = 0 \quad (15)$$

Equations (14)-(15) characterize the equilibrium of the political game. From an operational point of view, they can be used to compute the equilibrium by deriving the preferred tax rate  $\tau^*(\theta_d, k_{d,min})$  of increasingly more productive individuals and search for the productivity level that satisfies (15).

Note that social concerns influence the voting equilibrium in two ways. First, as described by Proposition 2, they affect the preferred tax rate of each individual, hence of the decisive voter. Second, they affect the identity of the decisive voter  $(\theta_d^*, k_{d,min})$  because they modify interclass coalitions through function  $Q$  (see Proposition 4). If either of the parameters  $\eta, \sigma_\theta$  and  $\sigma_k$  is equal to zero, then  $Q \equiv 0$  and the second effect can be ignored. This enables a simple characterization of the equilibrium tax rate.

**Remark 2.** *If social concerns are not relevant ( $\eta = 0$ ) then  $\tau^{VE} = \tau_B^*(\theta_d^m)$ . If social concerns matter and voters are homogeneous in terms of social class ( $\eta > 0, \sigma_k = 0$ ) then  $\tau^{VE} = \min \{1, \partial \ell^{-1}(-(1 + \eta)\theta_d)/\partial \tau\} > \tau_B^*(\theta_d^m)$ . If social concerns matter and voters are homogeneous in terms of productivity ( $\eta > 0, \sigma_\theta = 0$ ), then  $\tau^{VE} = 0$ .*

Remark 2 states that, when social comparisons are not relevant, the results in Meltzer and Richard (1981) hold true in our setting: the tax rate in the voting equilibrium coincides with the preferred tax rate of the median voter. This happens also when social concerns are

relevant, but voters are homogeneous in terms of social class. However, the decisive voter now supports redistribution also because he wants to reduce the social stigma he suffers in the consumption dimension. Thus, social concerns reinforce economic voting and the equilibrium tax rate is higher. Finally, if there is no heterogeneity in terms of productivity, individuals do not enjoy any redistributive benefit, but taxation is still distortionary. Then, all voters support a tax rate equal to 0, which thus emerges as the equilibrium outcome.<sup>33</sup>

Now suppose that  $Q$  is bounded away from 0 and that the assumption of Proposition 5 holds (i.e.,  $\eta \leq \bar{\eta}$ ). Then, a change in the relevance of social concerns affects both voters' preferences and the composition of the interclass coalitions. In other words, differently from a standard model of redistribution á la Meltzer and Richard (1981), the identity of the decisive voter (and of his coalition) is not fixed, but it varies in response to changes in  $\eta$ . Focusing on this last effect, we get:

$$\begin{aligned} \frac{\partial}{\partial \eta} \left( \int_{k_{d,min}}^{k_{d,max}} \int_{\theta_{d,min}}^{\vartheta(\theta_d^*, k_{d,min}, y)} f_d(x, y) dx dy \right) = \\ \int_{k_{d,min}}^{k_{d,max}} \frac{\partial Q(\theta_d^*, k_{d,min})}{\partial \eta} \cdot (y - k_{d,min}) \cdot f_d(\vartheta(\theta_d^*, k_{d,min}, y), y) dy. \end{aligned} \quad (16)$$

Because  $k_{d,min}$  is the lowest social class, the sign of this expression is determined by the effect of an increase in social concerns on the heterogeneity in productivity among decisive voters,  $\partial Q / \partial \eta$ . When it is positive, the mass of voters whose preferred tax rate is higher than  $\tau^*(\theta_d^*, k_{d,min})$  becomes larger than 50%. Then, to restore (15), the productivity of the decisive voter must decrease. Therefore, if the class of the original decisive voters is  $h(\theta_d^*)$ , Proposition 2 implies that the new decisive voter supports higher levels of redistribution and the equilibrium tax rate goes up. The statement of the next proposition exploits the fact that, when  $\eta = 0$ , the decisive voter is  $\theta_d^m$ .

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<sup>33</sup>The results in Remark 2 hold true also in the limit as each one of the parameters  $\eta$ ,  $\sigma_\theta$  or  $\sigma_k$  goes to 0.

**Proposition 6.** *Suppose  $\eta < \bar{\eta}$ . If  $k_{d,min} = h(\theta_d^m)$ , the productivity of the decisive voter is decreasing in  $\eta$  and the equilibrium tax rate is increasing in it.*

Proposition 6 implies that if the median productivity in the society is sufficiently lower than the average—graphically, if the decisive voter  $(\theta_d^m, k_{d,min})$  does not lie in the region highlighted with vertical lines in Figure 1—social concerns push the equilibrium tax rate above what would emerge without them. In terms of cross-country comparisons, the last statement implies that if two countries have the same distribution over types and the median productivity is sufficiently below the average, then redistribution is higher in the country where social concerns are stronger. To put it differently, in societies with right-skewed income distribution, tax rates increase with the overall importance of social concerns.

Instead, if the median productivity in the society is close to the average—the decisive voter lies inside the region highlighted with vertical lines in Figure 1—the effect of a change in the relevance of social concerns on the equilibrium tax rate can go in either direction. On the one hand, Proposition 2 implies that an increase in  $\eta$  makes the decisive voter more adverse to redistribution because the stigma he suffers in the social class dimension gets amplified. On the other hand, an increase in  $\eta$  also changes the identity of the voter, shifting him toward a less productive individual.<sup>34</sup> This pushes the equilibrium tax rate up. Depending on which of the two effects prevails, the equilibrium level of redistribution may thus decrease or increase.

The results discussed so far hold as long as the relevance of social concerns is not too large,  $\eta < \bar{\eta}$ . If this condition fails, aggregation may fail as well. Indeed, when  $\eta$  is large, the utility of voters may not be concave in taxation and this could lead to the non-existence of an equilibrium tax rate. To gain intuition, consider the following example with a discrete

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<sup>34</sup>To see this, suppose the productivity of the decisive voter is not decreasing in  $\eta$ . Then, by Proposition 1, there are voters to the north-west of the crossing point between the decisive voter's interclass coalition and  $h(\theta_d)$  for whom a raise in  $\eta$  results in a lower preferred tax rate. By Proposition 2 these very same voters should react to an increase in  $\eta$  by raising their preferred tax rate. This establishes a contradiction.

number of types.

**Example.** Suppose a unit mass of individuals is split in three different groups depending on their types: 49% has type  $(\theta, k) = (3, 3)$ , 49% has type  $(\theta, k) = (4, 3.2)$  and 2% has type  $(\theta, k) = (3.51, 3.55)$ . Let tax distortions be given by  $\ell(\tau) = \tau^2$ . Finally, assume that the relevance of social concerns is high,  $\eta = 3$ . Then, the first two groups have single-peaked preferences with optimal tax rates at  $\tau \simeq 0.71$  and at  $\tau = 0$ , respectively. Instead, the utility function of the third group has a local maximum at  $\tau \simeq 0.1$  and a global maximum at  $\tau = 1$ . It is then easy to check that, for any tax rate  $\tau$ , we can find another tax rate  $\tau'$  that is preferred to  $\tau$  by a majority of the population.<sup>35</sup> Hence, the Downsian model of electoral competition has no equilibrium in pure strategies  $\tau^{VE}$ . Instead, if the relevance of social concerns is not too large, say  $\eta = 1$ , all three groups have single-peaked preferences and the optimal tax rate of the third group is the equilibrium tax rate,  $\tau^{VE} \simeq 0.026$  (a similar conclusion would hold true also for any  $\eta < 1$ ).

The example shows that, when the relevance of social concerns is large, political equilibria in pure strategies may not exist. Nonetheless, following Bierbrauer and Boyer (2018), we can still provide conditions under which a majority of voters support a small deviation from a given tax policy. To clarify, let  $\tau^s$  be an arbitrary tax policy, which we assume to be in place. We say that a marginal tax increase is politically feasible if it is utility-improving for a majority of voters, namely if

$$\int_{\left\{(\theta_d, k_d): \frac{\partial v(\tau, \tau \bar{\theta})|_{\theta_d, k_d}}{\partial \tau} \Big|_{\tau=\tau^s} > 0\right\}} dF_d(\theta_d, k_d) \geq \frac{1}{2}. \quad (17)$$

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<sup>35</sup>This is a consequence of the double peak in the utility of the third group. Indeed, any  $\tau \in [0, 0.2]$  is defeated under pairwise majoritarian voting by  $\tau = 1$ , which is preferred by the first and third group. Any  $\tau \in [0.2, 0.8]$  is defeated by  $\tau = 0.1$ , which is preferred by the second and third group. Finally, any  $\tau \in [0.8, 1]$  is defeated by  $\tau = 0.71$ , which is preferred by the first and second group.



Symmetrically, we say that a marginal tax decrease is politically feasible if:

$$\int_{\left\{(\theta_d, k_d): \frac{\partial v(\tau, \tau \bar{\theta}) | \theta_d, k_d}{\partial \tau} \Big|_{\tau=\tau^s} \leq 0\right\}} dF_d(\theta_d, k_d) \geq \frac{1}{2}. \quad (18)$$

Exploiting the analysis carried out in the previous sections, we can provide sufficient conditions for the existence of a politically feasible marginal tax shift for arbitrary levels of social concerns. Consider voters  $(\theta_d^m, k_{d,min})$  and  $(\theta_d^m, k_{d,max})$ . By inspecting equation (7), we can conclude that if voter  $(\theta_d^m, k_{d,min})$  supports a marginal tax increase, the same must be true for all voters with either lower productivity, or higher social class, or both (in Figure 1, these are the voters to the north-west of him); similarly, if voter  $(\theta_d^m, k_{d,max})$  supports a marginal tax decrease, so do all voters with either higher productivity, or lower social class, or both (i.e., voters to the south-east of him in Figure 1). Importantly, these implications are valid no matter the size of  $\eta$ . The definition of median productivity further implies that both these masses of voters constitute a majority. Hence, voters  $(\theta_d^m, k_{d,min})$  and  $(\theta_d^m, k_{d,max})$  can be used to check whether a tax reform is feasible. In particular, if  $\partial v(\tau, \tau \bar{\theta}) | \theta_d^m, k_{d,min}) / \partial \tau |_{\tau=\tau^s} \geq 0$  ( $\partial v(\tau^s, \tau^s \bar{\theta}) | \theta_d^m, k_{d,max}) / \partial \tau |_{\tau=\tau^s} \leq 0$ ), the proposal of a marginal tax increase (decrease) would get the support of the majority of the electorate.<sup>36</sup>

Finally, it is important to highlight that all the results concerning individual preferences (Section 4) remain valid also when the relevance of social concerns is high. In other words, a high value of  $\eta$  poses a problem only when we want to aggregate individual preferences to obtain an equilibrium in a Downsian model. One possible approach to overcome this problem is to modify the modeling of the electoral competition. For instance, one could assume specific voting rules that guarantee the existence of an equilibrium. Alternatively, one could

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<sup>36</sup>Obviously, this is only a sufficient condition: a tax reform can be feasible also if none of the two conditions is satisfied. In general, to check the feasibility of a tax shift, one can also use voters that are not the ones with median productivity and still apply the same logic, i.e., verify that 50% of the electorate lies to their north-west or south-east. Finally, if we restrict attention to the working class (where the first order condition is guaranteed to identify the unique optimum) we can also use interclass coalitions to verify the feasibility of a reform. However, in this case, the identity of the relevant interclass coalition would vary with the size of  $\eta$ .

model electoral competition with a probabilistic voting model in which the responsiveness of different groups to changes in redistributive policies is heterogeneous.<sup>37</sup> However, both these approaches would necessarily require a number of additional assumptions that are beyond the main object of our analysis. We thus do not address this issue in more details.

## 6. Conclusions

People care about their relative standing in the society and status-seeking behavior has been proven to be an important driver of economic decisions in a variety of settings. In this paper, we studied how status concerns affect voters' preferences toward redistribution depending on their relative social standing. Our analysis can help rationalize highly debated deviations from pure economic voting, namely the fact that a non-negligible fraction of the socioeconomic elites appear to be relatively favorable to redistribution, whereas the opposite holds true for some members of the working class. We highlighted that social stratification may lead individuals who have the same gross income to vote for different tax rates. Similarly, it may lead voters with different incomes to support the same redistributive policies. This is because voters' preferences toward redistribution are shaped not only by their monetary interests (economic voting), but also by their desire to preserve/overcome the advantages/disadvantages they experience in terms of social class (social-class voting). When the relevance of social concerns is not too big, the interclass coalitions of voters that social concerns generate can be used to characterize the equilibrium tax rate. Investigating the origin and evolution of social concerns in a dynamic environment is a natural direction for future research. This could shed light on current cross-country differences in the determinants of social status as well as on the stability of such differences.

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<sup>37</sup>If all groups were equally responsive to changes in policies, a standard probabilistic voting model applied to our setting would imply that, absent social concerns, the equilibrium tax rate equals 0. This would limit the ability of such model to investigate the effects of social concerns on redistribution.

## Appendix

### Proof of Remark 1.

When  $\eta = 0$ , the utility function of all voters is strictly concave in  $\tau$  for all  $\tau > 0$ . Thus, (7) implies that the optimal tax rate of all voters is unique and equal to 0 if  $\theta_d \geq 0$  and to the solution of  $-\theta_d = d\ell(\tau)/d\tau$  otherwise (corner solutions at  $\tau = 1$  are ruled out by the assumptions in footnote 16).  $\square$

### Proof of Proposition 1.

Consider utility function  $v(\tau, g \mid \theta_d, k_d)$ . The function is twice continuously differentiable and its indifference curves are path-connected (this follows from the fact that the function is continuous in  $\tau$  and, furthermore,  $g$  enters additively linearly). Furthermore, observe that

$$\frac{\partial v(\tau, g \mid \theta_d, k_d)}{\partial \tau} = -\theta_d + \bar{\theta} - \frac{d\ell(\tau)}{d\tau} + \eta\sigma_\theta \cdot \frac{\lambda\sigma_k k_d - (1-\tau)((1-\tau)\sigma_\theta + 2\lambda\sigma_k)\theta_d}{((1-\tau)\sigma_\theta + \lambda\sigma_k)^2} \quad (\text{A.1})$$

$$\frac{\partial v(\tau, g \mid \theta_d, k_d)}{\partial g} = 1 > 0 \quad (\text{A.2})$$

It is immediate to verify that (A.1) is everywhere decreasing in  $\theta_d$  and increasing in  $k_d$ . Thus, the strict Spence-Mirrlees condition holds. Hence, the function has the strict single crossing property in  $-\theta_d$  holding  $k_d$  constant and in  $k_d$  holding  $\theta_d$  constant. Finally, given the additive structure of the utility function,  $v(\tau, g \mid \theta_d, k_d)$  is quasisupermodular. The statement of the Proposition thus follows from Theorem 4 in Milgrom and Shannon (1994) (see also Gans and Smart, 1996).  $\square$

### Proof of Proposition 2.

Let  $\theta_d \in [\theta_{d,min}, 0]$ . Define  $\hat{h}(\theta_d) = (1 - \tau_B^*(\theta_d))[(1 - \tau_B^*(\theta_d))\sigma_\theta + 2\lambda\sigma_k]\theta_d/(\lambda\sigma_k)$  (recall that in the absence of social concerns  $\tau_B^*(\theta_d)$  is a singleton).  $\hat{h}(\theta_d)$  is constant with respect to

$\eta$ , increasing in  $\theta_d$  for all  $\theta_d \leq 0$  and such that  $\hat{h}(0) = 0$ . Moreover,  $\hat{h}(\theta_d)$  is unconstrained and may thus be lower than  $k_{d,min}$ . Because  $\theta_d \leq 0$  and  $\hat{h}(\theta_d) \leq 0$ , the utility function of voter  $(\theta_d, \hat{h}(\theta_d))$  is strictly concave in the tax rate. Hence,  $\tau^*(\theta_d, \hat{h}(\theta_d))$  is a singleton and it is equal to  $\tau_B^*(\theta_d)$ . Pick any type  $(\theta_d, k_d) \in [\theta_{d,min}, \theta_{d,max}] \times [k_{d,min}, k_{d,max}]$  such that  $k_d \geq \hat{h}(\theta_d)$ . We want to show that  $\tau^*(\theta_d, k_d \mid \eta)$  is non-decreasing in  $\eta$ . Pick any  $\eta'$  and  $\tau^* \in \tau^*(\theta_d, k_d \mid \eta')$  (notice that this may not be a singleton because  $k_d$  may be above 0). Because  $k_d \geq \hat{h}(\theta_d)$ , Proposition 1 and the previous argument imply  $\tau^* \in [\tau_B^*(\theta_d), 1]$  (notice that the result of Proposition 1 does not depend on the specific set of classes  $[\theta_{d,min}, \theta_{d,max}] \times [k_{d,min}, k_{d,max}]$  and it extends to any subset of  $\mathbb{R}^2$ ). If  $\tau^* = 0$ , the result is trivially true. If  $\tau^* \in (0, 1)$ , (7) must hold with equality. Because  $\tau^* \geq \tau_B^*(\theta_d)$ , it must be the case that  $-\theta_d - d\ell(\tau^*(\theta_d, k_d))/d(\tau) \leq 0$ . Hence the last term in (7) must be non-negative. Thus, the utility function of voter  $(\theta_d, k_d)$  satisfies the single crossing property in  $\tau$  with respect to  $\eta$  and we can conclude that  $\tau^*(\theta_d, k_d \mid \eta)$  is non-decreasing in  $\eta$ . Similarly, if  $\tau^* = 1$  at  $\eta'$ , the last term in (7) must be positive, hence increasing in  $\eta$ . Thus, the single crossing property implies that  $\tau^*(\theta_d, k_d) = 1$  for every  $\eta'' \geq \eta'$ . By a symmetric reasoning, if  $k_d < \hat{h}(\theta_d)$ ,  $\tau^*(\theta_d, k_d \mid \eta)$  is non-increasing in  $\eta$ . Parts (i) and (iii) of the proposition follow from defining  $h(\theta_d) = \max\{\hat{h}(\theta_d), k_{d,min}\}$  for all  $\theta_d \leq 0$ .

Now consider  $\theta_d \in (0, \theta_{d,max}]$ . Pick  $\eta'$  and  $\tau^* \in \tau^*(\theta_d, k_d \mid \eta')$ . If  $\tau^* \in (0, 1]$ , we can replicate the same argument as before and conclude that the preferred tax rate is increasing in  $\eta$  (in this case the fact that the last term in (7) is positive follows directly from the fact that  $\theta_d > 0$ ). Suppose instead that  $\tau^* = 0$ . Focus first on the nouveau riche ( $k_d \leq 0$ ). Obviously (7) is negative for all  $\tau$  independently of the value of  $\eta$ . Thus, a tax rate equal to zero is the unique maximizer,  $\tau^*(\theta_d, k_d) = \{0\}$  for all  $\eta$ . Now consider types in the elite, i.e.,  $(\theta_d, k_d) \in \mathbb{R}_{++}^2$ . If  $0 \in \tau^*(\theta_d, k_{d,max})$ , let  $h(\theta_d) = k_{d,max}$ . Instead, if  $0 \notin \tau^*(\theta_d, k_{d,max})$ , let  $h(\theta_d) = \inf\{k_d : 0 \notin \tau^*(\theta_d, k_d)\}$ . This set is well defined because the set of maximizers

is upperhemicontinuous, Proposition 1 holds and we just argued that  $\tau^*(\theta_d, k_d) = \{0\}$  for all voters  $(\theta_d, k_d)$  with  $k_d = 0$ . Suppose there exist  $\theta_d''$  and  $\theta_d'$  such that  $\theta_d'' > \theta_d'$  and  $h(\theta_d'') < h(\theta_d')$ . By the upperhemicontinuity of the set of maximizers,  $0 \in \tau^*(\theta_d', h(\theta_d'))$ . By Proposition 1,  $0 \in \tau^*(\theta_d'', h(\theta_d'))$ , hence (again by Proposition 1)  $0 \in \tau^*(\theta_d'', k_d)$  for all  $k_d \in [h(\theta_d''), h(\theta_d')]$ . This contradicts the definition of  $h(\theta_d')$ . Thus,  $h(\theta_d)$  is weakly increasing in  $\theta_d$ . For any  $(\theta_d, k_d) \in \mathbb{R}_{++}^2$  for which  $0 \in \tau^*(\theta_d, k_d \mid \eta')$ , we must have that, for any  $\tilde{\tau} \in [0, 1]$ ,

$$\ell(\tilde{\tau}) + \tilde{\tau}\theta_d \geq \eta'\sigma_\theta\tilde{\tau} \cdot \frac{\lambda\sigma_k k_d - [(1 - \tilde{\tau})(\sigma_\theta + \lambda\sigma_k) + \lambda\sigma_k]\theta_d}{(\sigma_\theta + \lambda\sigma_k) \cdot [(1 - \tilde{\tau})\sigma_\theta + \lambda\sigma_k]}. \quad (\text{A.3})$$

If the right-hand side of (A.3) is negative for all  $\tilde{\tau} \in (0, 1]$ , it remains negative for all  $\eta \in \mathbb{R}_+$ . Thus  $\tau = 0$  is the unique best response. Instead, if the right-hand side of (A.3) is positive for some  $\tilde{\tau}^*$  (this is possible if and only if  $k_d > \theta_d$ ), we can find  $\eta'' > \eta'$  such that for  $\tilde{\tau}^*$  the inequality is reversed for any  $\eta \geq \eta''$  ( $\eta''$  is defined as the supremum of  $\eta$ s for which (A.3) holds. Since the right-hand side of (A.3) is positive this supremum is well defined). Then, if  $\eta \geq \eta''$ , there exists  $\tau^* > 0$  such that  $\tau^* \in \tau^*(\theta_d, k_d \mid \eta)$  for all  $\eta \geq \eta''$ . In either case,  $\tau^*(\theta_d, h(\theta_d) \mid \eta)$  is non-decreasing in  $\eta$ , proving part (iv) of the proposition. Finally, by construction,  $h(\theta_d)$  is constant in  $\eta$  if  $\theta_d \leq 0$  and non-increasing in  $\eta$  when  $\theta_d > 0$ , proving part (ii) of the proposition.  $\square$

### Proof of Proposition 3.

Define polarization as

$$\Pi = \int_0^{k_{d,max}} \int_{\theta_{d,min}}^0 \tau^+ f_d(\theta_d, k_d) d\theta_d dk_d - \int_{k_{d,min}}^0 \int_0^{\theta_{d,max}} \tau^- f_d(\theta_d, k_d) d\theta_d dk_d, \quad (\text{A.4})$$

where  $\tau^+ = \sup\{\tau^*(\theta_d, k_d)\}$  and  $\tau^- = \inf\{\tau^*(\theta_d, k_d)\}$ . We know that any voter  $(\theta_d, k_d)$  with  $\theta_d > 0$  and  $k_d \leq 0$  has a unique preferred tax rate equal to 0 for any profile of parameters

(see proof of Proposition 2). The proposition thus follows if we can show that for any  $(\theta_d, k_d)$  with  $\theta_d \leq 0$  and  $k_d > 0$ , any optimal tax rate  $\tau^*(\theta_d, k_d)$  is weakly increasing in  $\eta$  and weakly increasing in  $\sigma_\theta$  (weakly decreasing in  $\sigma_k$ ) when  $\sigma_\theta < \lambda\sigma_k$ . The first result follows from Proposition 2 after noticing that  $k_d > 0 \geq h(\theta_d)$  (recall that  $h(\cdot)$  is weakly increasing in  $\theta_d$  and equal 0 at  $\theta_d = 0$ ). Now consider changes in  $\sigma_\theta$  (the proof for  $\sigma_k$  is analogous). At  $\tau = 0$ , (7) is positive for any type  $(\theta_d, k_d)$  with  $\theta_d \leq 0$  and  $k_d > 0$ . Thus 0 cannot be an optimal tax rate. Differentiating (7) with respect to  $\sigma_\theta$  we get that  $\partial^2 v(\tau, \tau^* | \theta_d, k_d) / \partial \tau \partial \sigma_\theta \geq 0$  if and only if  $[\lambda\sigma_k - (1 - \tau)\sigma_\theta]k_d \geq 2\lambda\sigma_k(1 - \tau)\theta_d$ . Since  $\theta_d \leq 0$  and  $k_d > 0$ , the previous inequality is always satisfied if  $\lambda\sigma_k \geq \sigma_\theta$ . Monotone comparative static results (see Milgrom and Shannon, 1994 and the proof of Proposition 1 above) thus imply that any optimal tax rate  $\tau^*(\theta_d, k_d)$  is non-decreasing in  $\sigma_\theta$ .  $\square$

#### Proof of Proposition 4.

Because the utility function of voters is strictly concave,  $\tau^*(\theta_d, k_d)$  is a singleton. Then

$$\begin{aligned} \frac{\partial Q(\theta_d, k_d | \eta, \sigma_\theta, \sigma_k)}{\partial \eta} &= \\ &= \frac{\sigma_\theta \lambda \sigma_k [\sigma_\theta (1 - \tau^*(\theta_d, k_d)) + \lambda \sigma_k] [(\sigma_\theta (1 - \tau^*(\theta_d, k_d)) + \lambda \sigma_k) + 2\sigma_\theta \eta (1 + \eta) \frac{\partial \tau^*}{\partial \eta}]}{[(1 + \eta)(1 - \tau^*(\theta_d, k_d))\sigma_\theta + \lambda \sigma_k]^2 - \eta \lambda^2 \sigma_k^2}. \end{aligned} \quad (\text{A.5})$$

Such derivative is positive if  $\frac{\partial \tau^*}{\partial \eta} \geq 0$ . By Proposition 2, this is the case if  $k_d \geq h(\theta_d)$ .  $\square$

#### Proof of Proposition 5.

Define as in the main text  $\psi : [\theta_{d,min}, 0] \times [k_{d,min}, 0] \rightarrow [0, 1]$  as follows:

$$\psi(\theta_d, k_d) = \int_{k_{d,min}}^{k_{d,max}} \int_{\theta_{d,min}}^{\vartheta(\theta_d, k_d, y)} f_d(x, y) dx dy. \quad (\text{A.6})$$

Let  $\eta = 0$ . Then,  $Q(\cdot) \equiv 0$  and the utility function of all voters is strictly concave in  $\tau$ . Thus,

each voter has a unique preferred tax rate and, for any  $\theta_d < 0$ , this is the rate  $\tau \in (0, 1)$  that solves  $\varphi(\tau, \theta_d, k_d) = 0$  (recall that in the benchmark case, we rule out the possibility that some voters have a preferred tax rate equal to 1 by assuming that function  $\ell(\tau)$  is sufficiently steep). Because  $\theta_d^m < 0$ , this property holds true for more than 50% of voters. Moreover, when  $\eta = 0$ , voters' utility functions do not depend on social class and satisfy the single crossing property in  $\tau$  with respect to  $\theta_d$ . Then, standard results (cf. Gans and Smart, 1996) show that the voting equilibrium coincides with the unique policy preferred by the voter with median productivity. Thus, (14) and (15) must be satisfied.

Now suppose that  $\eta > 0$ . For any voter  $(\theta_d, k_d) \in \mathbb{R}_-^2$ , (8) is negative for all  $\tau \in [0, 1]$ . Define

$$\eta_1(\theta_d, k_d) = \begin{cases} 1 & \text{if } \lambda\sigma_k k_d \geq (\sigma_\theta + 2\lambda\sigma_k)\theta_d \\ \frac{\theta_d(\sigma_\theta + \lambda\sigma_k)^2}{\sigma_\theta[\lambda\sigma_k k_d - (\sigma_\theta + 2\lambda\sigma_k)\theta_d]} & \text{otherwise.} \end{cases} \quad (\text{A.7})$$

If  $\eta \leq \eta_1(\theta_d, k_d)/2$ , then  $\tau^*(\theta_d, k_d)$ , the unique preferred tax rate of voter  $(\theta_d, k_d)$ , is strictly between 0 and 1 and it is the unique tax rate  $\tau$  that satisfies  $\varphi(\tau, \theta_d, k_d) = 0$ .<sup>38</sup>

Furthermore, (8) implies that for any voter  $(\theta'_d, k'_d) \in \mathbb{R}_- \times \mathbb{R}_{++}$ , we can define

$$\eta_2(\theta'_d, k'_d) = \begin{cases} 1 & \text{if } \lambda\sigma_k \theta_d \leq \sigma_\theta k_d \\ \frac{d\ell^2(\tau)}{d\tau^2} \frac{[(1-\tau)\sigma_\theta + \lambda\sigma_k]^3}{2\sigma_\theta \lambda\sigma_k [\sigma_\theta k_d + \lambda\sigma_k \theta_d]} & \text{otherwise.} \end{cases} \quad (\text{A.8})$$

If  $\eta \leq \eta_2(\theta'_d, k'_d)/2$ , (8) is negative for every  $\tau \in [\tau^*(\theta_d, k_d), 1]$ .<sup>39</sup> By Proposition 1, if  $\eta \leq \eta_1(\theta_d, k_d)/2$  we know that the preferred tax rates of types  $(\theta_d, k'_d)$  with  $k'_d \geq k_d$  must be weakly higher than the unique preferred tax rate of voter  $(\theta_d, k_d)$ ,  $\tau^*(\theta_d, k_d)$ . If  $\eta \leq \min\{\eta_1(\theta_d, k_d)/2, \eta_2(\theta_d, k'_d)/2\}$ , since the utility function is strictly concave in  $\tau$  for all

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<sup>38</sup>The threshold guarantees that for these voters  $\varphi(\cdot)$  is not negative for all  $\tau$ . It can be shown that, because of our assumptions on  $d\ell(1)/d\tau$ ,  $\varphi(\cdot)$  cannot be always positive for all  $\tau$ .

<sup>39</sup>The threshold guarantees that (8) is negative for all  $\tau$  independently of the actual voter.

$\tau \in [\tau^*(\theta_d, k_d), 1]$ , the optimal tax rate of voter  $(\theta_d, k'_d)$  must be unique and it is either 1 or the solution to  $\varphi(\tau, \theta_d, k'_d) = 0$ . To rule out the first possibility, we can require  $\eta \leq \min\{\eta_1(\theta_d, k_d)/2, \eta_2(\theta_d, k'_d)/2, \eta_3(\theta_d, k'_d)/2\}$ , where  $\eta_3(\theta_d, k'_d) = [(d\ell(1)/d\tau) + \theta_d](\lambda\sigma_k/\sigma_\theta k'_d)$ . For every  $\theta_d \in [\theta_{d,min}, \theta_d^m/2]$ , let  $\eta^*(\theta_d) := \min\{\eta_1(\theta'_d, k'_d)/2, \eta_2(\theta'_d, k'_d)/2, \eta_3(\theta_d, k'_d)/2\}$  and observe that this threshold is bounded away from 0 for all  $\theta_d$ . Moreover,  $\eta^*(\theta_d)$  is a continuous function of  $\theta_d$ . Thus, it admits a minimum in the interval  $[\theta_{d,min}, \theta_d^m/2]$ . Let this minimum be  $\eta^*$ . Clearly,  $\eta^* > 0$ .

Now let  $\eta \leq \eta^*$  and consider voter  $(\theta_d^m, k_{d,max})$ . By the previous discussion,  $\tau^*(\theta_d^m, k_{d,max})$  is unique. By the construction of function  $\vartheta(\cdot)$  (see (10) and (11)), it must thus be the case that  $\varphi(\tau^*(\theta_d^m, k_{d,max}), \vartheta(\theta_d, k_{d,max}, k_d), k_d) = 0$  for all  $k_d$ . If  $\vartheta(\theta_d^m, k_{d,max}, k_d) \geq \theta_{d,min}$ , then  $\tau^*(\theta_d^m, k_{d,max})$  is also the optimal tax rate of voter  $(\vartheta(\theta_d^m, k_{d,max}, k_d), k_d)$  (recall that we are assuming  $\eta \leq \eta^*$ ). By the definition of  $\vartheta(\cdot)$ ,  $\vartheta(\theta_d^m, k_{d,max}, k_d) \geq \theta_{d,min}$  for all  $k_d$  if and only if  $\vartheta(\theta_d^m, k_{d,max}, k_{d,min}) \geq \theta_{d,min}$ . Because  $Q(\cdot)$  is increasing in  $\tau$ , this last condition is satisfied if  $\eta \leq [(k_{d,max} - k_{d,min}) / (\theta_d^m - \theta_{d,min})](\lambda\sigma_k/\sigma_\theta) := \eta_4$ . Following similar steps, we can also conclude that if  $\eta \leq [(k_{d,max} - k_{d,min}) / ((\theta_d^m/2) - \theta_d^m)](\lambda\sigma_k/\sigma_\theta) := \eta_5$ , then  $\vartheta(\theta_d^m/2, k_{d,max}, k_d) \geq \theta_d^m$  for all  $k_d$  and  $\tau^*(\theta_d^m/2, k_d)$  is the preferred tax rate of all voters  $(\vartheta(\theta_d^m/2, k_{d,max}, k_d), k_d)$ . Let  $\eta^{**} := \min\{\eta_4, \eta_5\}$ . Obviously,  $\eta^{**} > 0$ .

Define  $\bar{\eta} = \min\{\eta^*, \eta^{**}\}$ . By the previous results, if  $\eta \leq \bar{\eta}$ , any voter  $(\vartheta(\theta_d, k_{d,max}, k_d), k_d)$  with  $\theta_d \in [\theta_d^m, \theta_d^m/2]$  and  $k_d \in [k_{d,min}, k_{d,max}]$  has a unique optimal tax rate and this tax rate solves  $\varphi(\tau, \vartheta(\theta_d, k_{d,max}, k_d), k_d) = 0$ . Furthermore, for all  $\theta_d \in [\theta_d^m, \theta_d^m/2]$  define

$$\hat{\psi}(\theta_d) = \int_{k_{d,min}}^{k_{d,max}} \int_{\theta_{d,min}}^{\vartheta(\theta_d, k_{d,max}, y)} f_d(x, y) dx dy. \quad (A.9)$$

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<sup>40</sup>Because  $\eta \leq \bar{\eta}$ ,  $\vartheta(\theta_d, k_{d,max}, y) \geq \theta_{d,min}$  for all  $\theta_d \in [\theta_d^m, \theta_d^m/2]$ .



The function (A.9) is continuous in  $\theta_d$ . We can thus differentiate (10) and get

$$\frac{\partial \vartheta(\hat{\theta}_d, k_{d,max}, k'_d)}{\partial \hat{\theta}_d} = 1 + (k'_d - k_{d,max}) \cdot \frac{\partial Q}{\partial \tau} \cdot \frac{\partial \tau^*(\hat{\theta}_d, k_{d,max})}{\partial \theta_d} > 0, \quad (\text{A.10})$$

where the inequality follows from Proposition 1 and the fact that  $\partial Q / \partial \tau > 0$  (cf. (11)).

Because  $f(\theta_d, k_d) > 0$  for all  $(\theta_d, k_d)$ ,  $\hat{\psi}(\theta_d)$  is increasing in  $\theta_d$  in the interval  $[\theta_d^m, \theta_d^m/2]$ .

Finally, because  $\eta \leq \bar{\eta}$ , the definition of  $\theta_d^m$  yields that  $\hat{\psi}(\theta_d^m) < 1/2$  and  $\hat{\psi}(\theta_d^m/2) > 1/2$ .

We conclude that there exists a unique  $\theta_d^\dagger \in [\theta_d^m, \theta_d^m/2]$  such that  $\hat{\psi}(\theta_d^\dagger) = 1/2$ .

If  $\eta \leq \bar{\eta}$ , starting from voter  $(\theta_d^\dagger, k_{d,max})$ , function  $\vartheta(\theta_d^\dagger, k_{d,max}, k_d)$  uniquely identifies a mass of voters in each class  $k_d$  that supports levels of redistribution above or below  $\tau^*(\theta_d^\dagger, k_{d,max})$ .

Integrating over the set of social classes, we obtain the mass of voters in the overall population

with preferred tax rate above or below  $\tau^*(\theta_d^\dagger, k_{d,max})$ . As argued in the main text, in a

Downsian model of electoral competition both candidates propose the tax rate preferred by

voter  $(\theta_d^\dagger, k_{d,max})$ . This is also the preferred tax rate of any voter  $(\vartheta(\theta_d^\dagger, k_{d,max}, k_d), k_d)$ . By

construction, such tax rate is the unique value that solves  $\varphi(\tau, \vartheta(\theta_d^\dagger, k_{d,max}, k_d), k_d) = 0$ .

The Proposition follows by defining  $\vartheta(\theta_d^\dagger, k_{d,max}, k_{d,min}) = \theta_d^*$ .  $\square$

## Proof of Remark 2.

When  $\eta = 0$ , preferences of voters differ only insofar their productivity differ (see (7)).

Because the utility function satisfies the strict single crossing property, we can use standard

results (see Gans and Smart (1996)) to show that the equilibrium tax rate coincides with

the preferred tax rate of the voters with median productivity. The same is true, if  $\eta > 0$

and  $\sigma_k = 0$ . However, in this latter case, the preferred tax rate of the voters with median

productivity is given by  $\{d\ell(-(1+\eta)\theta_d^m)/d\tau, 1\}$ . Because function  $\ell(\tau)$  is strictly convex,

this value is greater than  $\tau_B^*(\theta_d^m)$ . Finally, if  $\eta > 0$  and  $\sigma_\theta = 0$ , (7) is negative for all tax

rates and for all voters. Thus, the preferred tax rate of all voters is 0 and the equilibrium

tax rate is also equal to 0. □

### **Proof of Proposition 6.**

Pick any voter  $(\theta_d, k_d) \in \mathbb{R}_+^2$  such that  $k_d \geq h(\theta_d^m)$ . By Proposition 4,  $Q(\theta_d, k_d)$  is increasing in  $\eta$ . Hence, the interclass coalition becomes flatter. Furthermore, by Proposition 2, the preferred tax rate of voter  $(\theta_d, k_d)$  increases, and so does the preferred tax rate of any voter  $(\theta'_d, k_d)$  with  $\theta'_d < \theta_d$ .<sup>41</sup> If  $k_{d,min} = h(\theta_d^m)$ , (16) together with the previous discussion imply that the productivity of the decisive voter decreases with  $\eta$  at  $\eta = 0$ , and thus its preferred tax rate increases with  $\eta$ . Because,  $h(\theta_d)$  is constant with respect to  $\eta$ , the same conclusions are true for any (decisive) voter  $(\theta_d^*, k_{d,min})$  with  $\theta_d^* \leq \theta_d^m$ , thus proving the statement of the proposition. □

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<sup>41</sup>To see this analytically, we can apply the implicit function theorem on (7) and use the fact that  $k_d \geq h(\theta_d)$  and (8) is negative (this follows from the fact that the voter is in the working class) to sign  $\partial \tau^*(\theta_d, k_d)/\partial \eta$ .

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